Art. VIII.—*The Cryptogamia of the Australian Alps.*

Part I.

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The following brief notes on some Habitats of the Cryptogamic Plants of the Australian Alps are given in continuation of the author's Notes on the "Phanerogamia of the Mitta Mitta," &c., previously published in the Transactions of the Royal Society.* The value of a systematic description of the Florula of a region so unique in its geographical position with respect to any other series of mountain ranges, as the Australian Alps undoubtedly is, will no doubt prove serviceable to students of Phytography. Although we are all deeply indebted to the writings of Sir F. von Mueller, K.C.M.G., &c., our illustrious and even now venerable botanist—particularly the information given in Vol. XI. of the *Fragmenta Phytographiecæ* and other publications; and also to the writings of several distinguished specialists, as Mr. Mitten,† and other bryologists, mycologists, &c.—yet, if we except the general remarks given in the local writings of Mr. Bailey, F.L.S., of Queensland, Mr. French of Melbourne, Professor Tate of South Australia, and a few other well-known Australian botanists, very little has been done towards grouping together the Cryptogamic Florula of typical areas. The altitudinal and, consequently, climatic zones of the Australian Alps, with the varying conditions of humidity and frequent alternations of geologic formations, afford excellent means of studying the differentiation of varietal forms, and, consequently, their biological developments. In a subsequent article I hope to be able to supply xylographic drawings of the micro-fungi and other lowly mycologic forms. To Baron von Mueller and Mr. Sullivan, F.L.S., of Moyston, the author tenders sincere thanks for assistance in naming the species herein recorded.

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* Trans. Royal Society Vic., Vols. XIX. and XX.

† Australian Mosses, Vol. XIX. Trans. Royal Society Vict., p. 50.

ACOTYLEDONEÆ.

ACOTYLEDONEÆ VASCULARES.

1. Rhizospermæ.

1. Azolla magellianica (F. v. M.).—Is abundant in the still waters of sub-alpine pools, along the courses of the Livingstone Creek, especially near Omeo, at an elevation of 2200 feet, where its bright green, red, or purplish imbricated leaves form a carpet-like coating on the surface.

2. Lycopodineæ.

2. Lycopodium Selago (Linné).—This handsome club-moss is most abundant in the shaded crevices of granitic rocks, near the summits of Mount Kosciusko, at elevations between 6000 and 7000 feet.
2. Lycopodium clavatum (Linné).—On the gravelly depressions (old miocene river-beds) at the lower levels of the Dargo High Plains; this interesting species is found at an elevation of 4000 feet; and also near the summits of Mount Kosciusko, in similar situations to L. Selago; in the latter place in a slightly altered form.
3. Lycopodium densum (Labill.).—On the porphyritic areas near Mount Cobboras, between 3000 and 5000 feet elevation.
1. Selaginella Preissiana (Spr.)—In similar habitats to Lycopodium densum, but exhibiting great variety in the length of its stem, and in the character of its foliage, being more close and dense at the higher elevations.

2. Filices.

1. Ophioglossum vulgatum (C. Bauh.).—Common on the subalpine flats of the metamorphic schists near Omeo; 2000 to 3000 feet elevation.
2. Botrychium Lunaria (Swartz).—The common British moonwort; also occurs on the flats of the Livingstone Creek.
2. Botrychium ternatum (Swartz).—In the moist glens of Silurian rocks in the Macalister River sources at elevations of 2000 and 3000 feet.
1. Hymenophyllum Tunbridgense (Sm.).—This beautiful and delicately fronded fern is very prolific in the

heads of gullies on the littoral slopes of the Dividing Range, growing luxuriantly on decaying logs of deeply-shaded fern-tree gullies. It ascends to sub-alpine stations of 3600 feet elevation. It also occurs on some northern or inland slopes, such as the Buffalo Ranges, but it appears to be most prolific on the littoral areas where more equable temperature prevails.

1. Gleichenia circumata (Swartz).—Is more plentiful on the northern sub-alpine flats, especially towards the sources of the Benambra Creek, and in the Ovens valley. In the former it is found growing in the shade of various endemic shrubs, such as Drimys aromatica, &c., with whose dark sap, green foliage, its light emerald-tinted fronds form an agreeable contrast.
2. Gleichenia dicarpa (R. B.).—In similar habitats with G. circumata, but also at lower levels in the Mitta Mitta sources.
1. Dicksonia Billardieri (F. v. M.).—This magnificent tree-fern is the principal species clothing the heads of gullies in the Australian Alps. Its greatest luxuriance is attained at elevations of 3000 feet, where the decay of its lower fronds largely helps to form that deep vegetable mould so characteristic of these localities. A sub-alpine glen clothed with a vigorous growth of these handsome fern-trees, with tall straight-stemmed eucalyptus and acacias, and fringed with such beautiful endemic shrubs as Lomatia ilicefolia, Zeria Smithii, Senecio Bedfordii, and various asters, &c., is perhaps the most recherché of all the varied forms of botanical scenery to be met with in the sub-alpine zone of the Australian Alps.
1. Alsophila Australis (R. B.).—Also an inhabitant of the moist southern glens, but extending to the grassy slopes as well. Does not ascend to the same elevation as D. Billardieri.
1. Davallia dubia (R. B.).—Common in some localities, in the Wentworth Valley, near the Dividing Range, and in the Indi above Tom Groggin. Ascends to 3600 feet, both on Silurian and metamorphic soils.
1. Lindsaya linearis (Swartz).—On the Tambo River, especially on the quartz-mica-diorites of Mount Elizabeth. Ascends to 3000 feet.

Adiantum Æthiopicum (Linné).—The Maidenhair is, perhaps, one of the most abundant species of fern. It is found growing at almost every elevation, in rocky situations up to 6000 feet. Although most prolific in the crevices of potash-yielding rocks, as in the felsitic intrusions near Omeo, it is probable, however, that its greater luxuriance at these localities is, after all, an accidental circumstance, and that humidity of temperature predominates in causing its vigorous growth at these elevations, 2000 to 3000 feet.

1. Cheilanthes tenuifolia (Swartz).—Common on rocky situations at all elevations up to 4000 feet, particularly in granitic areas, and on the metamorphic rocks near Omeo.

1. Pteris falcata (R. B.).—In the littoral areas along the Tambo, Mitchell, and Dargo river valleys, in rich mould, of dense scrubs. Most prolific ascending to elevations of 4000 feet. Near Omeo its character approaches that of Pteris rotundifolia.

2. Pteris umbrosa (R. B.).—Ascends in some gullies from the coastal regions to an elevation of 3000 feet; generally in shaded valleys, on rich moulds, where it attains a height of three feet.

3. Pteris tremula (R. B.).—Found growing in the damp entrances to caves on the upper Silurian limestone formation, near sources of the Murray, 3000 feet elevation; also in fern-tree gullies between Wentworth and Dargo Rivers, in Silurian slate, &c., at similar elevations.

4. Pteris aquilina (Linn. var.).—Forms a dense undergrowth in the alluvial flats of some of the mountain streams, where it frequently attains a height of eight feet; it ascends to elevations of 5000 feet, and appears to be the most ubiquitous of all the endemic ferns.

5. Pteris incisa (Thunberg).—In the rich moulds of fern-tree gullies, on the littoral slopes, this bright-green species attains a great luxuriance, growing to a height of eight feet; it ascends to elevations of 4000 feet. Humidity seems to dominate the growth of this species.

1. Lomaria discolor (Willd.).—A very abundant species on the grassy heads of gullies, Dividing Range, near Omeo, where it forms a characteristic feature in the

landscape. The form of its fronds differentiates very much at sub-alpine habitats. It ascends to 5000 feet elevations.

2. Lomaria lanceolata (Spreng.).—In similar habitats with L. capensis, but confined chiefly to the fern-tree gullies on the littoral areas, &c., towards Gippsland. It ascends to 4000 feet, and at this elevation the growth is luxuriant.

Lomaria alpina (Spreng.).—This pretty little fern is very common on the metamorphic and granite areas in the Australian Alps, ascending to the Mount Kosciusko plateaux, where it is found growing in the crevices of the rocks at an elevation of 7100 feet.

Lomaria fluvialitis (Spreng.).—Not uncommon in deeply shaded gullies, near water channels, and at sources of springs on all the streams flowing from the Australian Alps; ascends to fully 5600 feet, but most luxuriant at the sub-alpine zone where moisture prevails.

Lomaria capensis (Willd.).—Is one of the most common of all the endemic ferns; generally most abundant in shaded grassy banks of creeks and gullies. On the Silurian slates, Wentworth River, at an altitude of 3000 feet, its fronds attain a length of six feet, with large pinnæ four feet long and over one inch broad.

1. Blechnum cartilagineum (Swartz).—Only observed by me on the Mitta Mitta metamorphic schists at an altitude of 2000 feet, and on the Tambo River banks at lower levels.

1. Doodia (Woodwardia) aspera (Mett.).—On the Silurian formation in shaded hill sides of Dargo and Wentworth rivers at an elevation of 2000 and 3000 feet; also on the Mitta Mitta sources.

1. Asplenium Trichomanes (Linn.).—Very abundant on the limestone rocks, in the Limestone Creek valley, at an elevation of 3000 feet, ascending in the Mitta Mitta sources on the granitic areas to 5000 feet.

2. Asplenium flabellifolium (Cav.).—All over the sub-alpine areas in the Australian Alps, not restricted to any formation, growing in rocky crevices, ascending to elevations of 6000 feet.

3. Asplenium Hookerianum (Colens.).—In similar habitats to A. Trichomanes, and at Day's Hill, near Omeo, on intrusive granite areas; ascends to 4000 feet.

4. Asplenium bulbiferum (Forst.).—Common on the moist Silurian ranges around Grant; generally in shaded gullies, on the littoral slopes; ascends to 3600 feet.
1. Aspidium acuelatum (Swartz).—Very abundant at sub-alpine altitudes on Silurian formations, especially towards the coastal regions.
2. Aspidium decompositum (Spreng.).—Occurs principally in the moist heads of gullies in the Mitchell River source basin; ascending to 3000 feet elevation.
1. Polypodium punctatum (Thun.).—On the heads of gullies in Dargo River valley, Silurian formation. This somewhat ubiquitous species is abundant; it ascends to 3000 feet.
1. Grammitis rutifolia (R. B.).—In the crevices of granite rocks all over the Mitta Mitta sources, ascending to 5000 feet; also on the Tambo and Mitchell River source basins, but most prolific on the metamorphic areas.

Acotyledoneæ Evasculares.

1. Dicraneæ.

1. Dicranella rufo-aurea (Hampe).—On the porphyritic rocks near summit of Mount Cobboras, at elevations of 5000 feet; and on the Limestone Creek at lower levels.
1. Blindia robusta (Hampe).—From the shaded sidelings of mica schist near Omeo (2000 feet) to the summits of Mount Kosciusko, on granitic rocks, at an elevation of 7000 feet.
1. Dicranum punctulatum (Hampe).—On the metamorphic schists near Omeo, between 2000 and 3500 feet.
1. Ceratodon purpureus (Bridel).—This moss is very common on the sites of old gold workings near Omeo, where the aluminous and potash soils are disintegrated; it ascends to 4000 feet.

2. Grimmicæ.

1. Grimmia apocarpa (Hed.).—Also common on the gneissose rocks near Omeo, at 2000 feet elevations. Abundant along with G. cygnicolla (C. pulvinata) and forming dense tufts.

2. Grimmia pulvinata (Hook. et Taylor).—Forms dense patches of a greenish grey on the granitic and gneissose rocks near Omeo, and at higher levels in the Mitta Mitta sources.
3. Grimmia languinosa (C. Muell.).—A form which is either this or a closely allied species, as found growing on the granite rocks near summit of Mount Kosciusko, at elevations of 7000 feet.
4. Grimmia Sullivani (C. M.).—This species was first discovered near Omeo by the gentleman whose name it bears; it is common all over the alps up to 6000 feet, principally on the metamorphic areas.

3. Tortuliæ.

1. Phascum disrumpens (C. M.).—Not common, but where found rather gregarious. Livingstone Creek, near Omeo.
1. Weisia nudiflora (C. M.).—Also uncommon, in similar localities with P. disrumpens.
1. Tortula rubra (Mitten.).—Common in the Mitta Mitta, Mitchell, and Tambo River source basins, at various elevations between 2000 and 6000 feet.
1. Encalyptra Tasmanica (Hampe)—This is perhaps the most widely distributed of all the mosses, being found at all elevations from the sub-alpine zone to the summits of the highest alps.

4. Orthotricheæ.

1. Orthotrichum laterale (Hampe).—On the banks of the Indi River, at base of Mount Kosciusko (1200 feet), and on Coowombat Creek at higher levels, principally on alluviums, at 3600 feet.
1. Apalodium lanceolatum (Mitten).—On the Moroko River and towards its sources, near Mount Wellington; upper Devonian and Silurian formations; ascends to 5000 feet.
1. Zygodon sp.—Found by Mr. Sullivan on Mount Kosciusko, when botanising with the writer during January, 1884, at an altitude of 6500 feet.

5. Funarieæ.

1. Physcomitrium subserratum (C. M.).—Previously recorded by Baron von Mueller from Dargo River,

but found by the writer on the Wentworth River sources, near main Dividing Range; Silurian formation at 3600 feet.

1. Enthostodon laxus (J. Hook. et Wils.).—On the southern slopes of the great Dividing Range; not common.
2. Enthostodon minuticaulis (C. M.).—Found near Omeo, on the mica-schists and alluvium, by Mr. Sullivan during January, 1884.
3. Enthostodon apophysatus (Tayl.).—On the edge of the Omeo Plains, near Lake Omeo; 3000 feet elevation.

1. Funaria hygrometrica (Linné).—Common at the sites of burnt eucalyptus logs and on clayey soils near Omeo.
2. Funaria pulchridens (C.M.).—In similar localities with F. hygrometrica.

6. Bartramieæ.

1. Bartramia Hampei (Mitten).—On the shaded banks of the Livingstone Creek (2000 feet) and near the summits of Mount Kosciusko; metamorphic and granitic areas.

1. Philonitis appressa (J. Hook.).—On the Dividing Range, near Omeo; 4000 feet elevation.
2. Philonitis fertelis (Mitt.).—On the sources of the Mitta Mitta, ascending to Mount Hotham at 6000 feet elevation.

1. Brutelia affinis (Hook.).—On the granitic bosses of Mount Hope, between the Mitta Mitta and Hume Rivers, and also on the Buffalo Ranges, in the Ovens valley.
2. Brutelia commutata (Hampe).—Very abundant on the metamorphic schists in the Livingstone Creek valley, where it forms thick coatings in shaded sidelings; ascends to 5000 feet
3. Conostomum curvirostre (Mitt.).—Baron von Mueller records this moss from the Mienyang Mountains, but it is common on Mount Sisters, near Omeo Plains, on granitic and quartz-porphyry areas; 3000 to 4000 feet.

1. Meesia Muelleri (C. Muel.).—On the porphyritic rocks at Mount Cobboras, and also on the summits of Mount Kosciusko; the latter habitat discovered by Mr. Sullivan.